



15 ways Los Alamos made an impact in 2020 — COVID-19 and beyond

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From innovation in education to nonreactive nuclear energy, COVID-19 forecasts to jet fuel produced from corn, the Laboratory spent the year impacting the nation — and New Mexico

1: Front-line fighters in the war against COVID-19

Beginning in March and still going strong, Laboratory experts in computer modeling and disease forecasting have been some of our most-quoted scientists of 2020. Computational epidemiologists Sara Del Valle, David Osthus and Carrie Manore, theoretical biologists **Bette Korber** and **Ruian Ke**, and manager in Biosecurity and Public Health Jeanne Fair are just a few who shared their knowledge with the nation via Bloomberg News, The Daily Beast, National Public Radio, Public Radio International, The New York Times, Nature and Scientific American, and with New Mexicans in the [Albuquerque Journal](#), KOB-TV, Santa Fe Reporter, Santa Fe New Mexican and many more.

2: X-ray revision

[A more-sensitive X-ray detector](#) developed at the Laboratory enables medical and dental imaging at extremely low doses, which is more beneficial for patients. Physicist **Wanyi Nie** and her team developed the detector using a thin film of the mineral perovskite, which is 100 times more sensitive than conventional silicon-based devices, reported Physics World magazine in April. Recently, the Physics World editorial team also chose the detector as one of its [“Top 10 Breakthroughs of the Year.”](#)

3: Fire prevention

As wildfires blazed across the West in 2020, [Laboratory scientists prioritized prevention close to home and nationally](#), wrote **Michael Hazen**, associate laboratory director for environment, safety, health quality, safeguards and security in his October editorial in the Santa Fe New Mexican. In the high-desert landscape surrounding the Lab, experts thinned trees, cleared undergrowth, and added minimally invasive bridges for

emergency vehicles. At the same time, the FIRETEC computer program simulated and predicted fire spread around the country, while the Lab's mesa-top facility Center for Aerosol-gas Forensic (CAFÉ) analyzed smoke particles and their impact on health, local weather, air quality and climate.

4: Strategic science

Most people know there is a nuclear testing moratorium, yet nuclear weapons still exist, so [“How do we know the systems still work?”](#) asked Gizmodo in May. Reporter **Ryan Mandelbaum** visited the Laboratory to witness how experts use experiments with explosives paired with supercomputer simulations to keep the nuclear stockpile safe and secure—decades after the United States' last nuclear test.

5: Taming the beast of transuranic waste

The contents of the drums of waste coming out of the Laboratory's nuclear facilities vary from metal tools and used gloves to wipes and other objects that have come into contact with radioactive material. These are carefully packaged, then shipped to the Waste Isolation Pilot Plant (WIPP) outside Carlsbad, where they are buried 2,000 feet below ground. In 2020, the Laboratory improved its safety procedures by increasing the number of oversight personnel, implementing updated tracking software, and acquiring new safety equipment.

6: Science education comes home

This year found parents, teachers, and students in our community needing new resources for different ways of learning. The Laboratory teamed up with regional education and nonprofit partners to launch the [New Mexico STEAM Hub](#), an online, one-stop shop. It includes parent guides for K-12 learning, a New Mexico Wi-Fi hotspot map, childcare resources, virtual field trips, and hands-on activities to do at home. KOB-TV4 [reported the initiative to the community](#).

7: Plutonium progress

Deep-space missions, nuclear nonproliferation, and stockpile upgrade projects now have the support they need, thanks to [plutonium-facility modernization](#) completed in October — early and under budget. The project received kudos from the National Nuclear Security Administration (NNSA).

8: Kernels of truth for biofuels

Biofuels have big potential, as [Popular Mechanics](#) recognized in May when it reported “The new Tomahawk Missile now runs on corn,” detailing how Laboratory scientists developed a replacement jet fuel for the JP-10 made from corn bran and other feedstocks, designed to reduce the U.S. military's dependency on foreign petroleum.

9: High performance computing takes on COVID-19

“At Los Alamos National Lab, [supercomputers are optimizing vaccine distribution](#),” reported HPC Wire. “Over the course of the year, LANL has pitted its supercomputing prowess against every aspect of the pandemic,” the story continued “from modeling the virus and its spread to investigating various pharmaceuticals that might mitigate or prevent infections.” Now they are calculating how best to distribute the new Pfizer vaccine to protect the most vulnerable and slow the spread of COVID-19.

10: Science with heart

Structural biologist Karissa Sanbonmatsu revealed on KOB-TV4 that unraveling the mysteries of RNA spools could eventually give scientists the ability to [grow new human hearts and better understand heart disease](#). Sanbonmatsu and her team developed the first full 3-D structure of a heart RNA molecule early this year.

11: A new take on nuclear power

As the world searches for ways to reduce climate change, nuclear energy may be more viable now that researchers at the Laboratory can [generate nuclear power with nonradioactive actinides](#), which are safer and less costly than the more commonly used uranium dioxide, reported Engineering & Technology magazine in November.

12: Isotopes for curtailing cancer

Actinium-225, which results from radioactive decay of uranium, has shown promise in treating a range of cancers. This July, Chemical & Engineering News explained how a Washington-based company is [extracting the medical isotope](#) from nuclear waste provided by Los Alamos, Oak Ridge, and Brookhaven national laboratories. No actinium-based drugs are yet approved by the FDA, but if any get a green light, the medical community will need multiple ways to produce them.

13: Mentorship matters

A [new teacher-in-residence program](#) aims to reduce teacher shortages in New Mexico and train teachers who reflect the population diversity of the schools where they work. Education experts at the Laboratory, New Mexico Highlands University and the New Mexico Department of Public Education have devised an approach offering 10 New Mexico residents who are teachers in training the combination of mentorship, professional development, classroom experience, and a stipend of \$20,000. The teachers work in the districts of Albuquerque, Bernalillo, Pojoaque Valley and Santa Fe.

14: Keeping the home fires burning

Fallen trees on Lab property became more than [150 cords of firewood for neighboring pueblos](#) this October. Trucks lined up near the Laboratory fire station as tribal members of San Ildefonso, Cochiti, Jemez, and Santa Clara pueblos picked up their shares. Back in 2019, heavy rains followed by a windstorm toppled about 2,500 trees around the

Laboratory. Some were appropriated for lumber; the rest are now warming woodstoves and kiva fireplaces in Northern New Mexico.

15: Lab dollars' deep impact

The Laboratory [contributes \\$3.1 billion](#) to the New Mexico economy each year and creates 24,169 jobs.

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